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# SCIENCE

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FRIDAY, FEBRUARY 17, 1899.

## THE ECONOMIC STATUS OF INSECTS AS A CLASS.\*

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MSS. intended for publication and books, etc., intended for review should be sent to the responsible editor, Professor J. McKeen Cattell, Garrison-on-Hudson N. Y.

THE popular conception of insects in general is undoubtedly that they are injurious. Many writers, it is true, have pointed out the benefits derived from insects, but we think of their damage to crops and of their annoyance to man and animals, and this aspect of the subject is at once apt to preponderate in our minds. It is more than 80 years since Kirby and Spence contrasted the injuries caused by insects with the benefits derived from them, and it has not been comprehensively done since. In the meantime, whole groups of important injuries have been developed and whole classes of beneficial work have been discovered. Moreover, the tendency of modern thought has not taken this direction. The biologic, taxonomic and phylogenetic, and other aspects of large groups of forms of life have been considered to the exclusion of the economic aspect, and even where this side has attracted attention investigators have confined themselves to specific problems and have not generalized. It may be interesting, therefore, once more to contrast the injurious insects with the beneficial ones in an effort to gain a clearer idea of the status of the group in its relations with man.

In a broad way, we may consider the subject under the following heads :

\* Address of the retiring President of the Biological Society of Washington, delivered January 18, 1899.

kills the bacilli and their spores with incredible rapidity. The dryness and cold also work against the existence of microbes.

But how can the rarefied air influence favorably pulmonary tuberculosis? After prolonged experimental study our authors sum up their results in certain theorems, which are discussed separately: (I.) Lessening pressure increases the circulation of air in the lungs, dilates them and obliges torpid parts to functionize. (II.) Lessening pressure determines a greater quantity of blood to the lungs. (III.) Lessening pressure, dilating the lungs, permits a uniform distribution of blood, makes regular its circulation and thus combats congestion. (IV.) Lessening pressure diminishes intrapulmonary tension in general and in particular intravascular tension. (V.) Augmentation of red globules and white globules. (VI.) Desiccation of mucous surfaces. The favoring of evaporation.

Numerous experiments on animals were followed by the actual treatment of tuberculosis by rarefied air, diminution of pressure. The results were highly encouraging and remarkable. Of the 13 healthy persons and numerous consumptives submitted to the action of rarefied air not one experienced the alarming symptoms described by P. Bert (*Pression barométrique*, p. 750). The experiments of Paul Bert having been credited, put a stop to all progress in these matters, and the whole world is indebted to Herrera and Lope for removing the embargo and smashing the tabu.

Of 13 cases of pulmonary tuberculosis treated by baths of rarefied air only one lost weight, one remained stationary, eleven increased most notably in weight, one increasing 300 gr. each day, one increasing 28 gr. each day during 4 months of treatment.

Our authors hold that the acclimation of plants, animals and man to the atmospheric conditions of high altitudes is rapid and in general perfect, without the slightest loss of vigor.

The vegetable kingdom reaches its maximum at high altitudes. As for mere size we need only mention the great tree of Tula and the tree of Montezuma. Any limitation is question of temperature, not atmospheric density. Species ascend the summits as they approach the equator. This is a pregnant hint for scientific

agriculture. The more intense light of the altitudes, as also the dryness and decreased pressure, influence favorably the formation of chlorophyl, the decomposition of carbonic acid, the formation of amidon, the movement of protoplasm, the multiplication of epidermic cells, the force of transpiration, the absorption of oxygen.

As for animals, the fact that many species emigrate periodically to high altitudes and flourish there proves that often acclimation is exceedingly quick. Mammals are subject to 'mal des montagnes' and then must undergo a period of acclimation more or less troublesome. The symptoms are analogous to those in man. But the result is perfect adaptation. Longevity is not decreased, nor fecundity, nor secretions (*e. g.* milk).

In the blood the number of red globules augments with the altitude. There is an exact proportion between this number and the barometric pressure of the locality. This is so little known that in Mexico reputable physicians have declared patients not suffering from anemia despite most evident symptoms, simply because microscopic examination of the blood disclosed the number of the globules considered as normal in Europe! The tension of the blood diminishes with the altitude. On the other hand, the intensity of intra-organic combustion, the temperature, the colorification is exactly the same for inhabitants of the City of Mexico, at an elevation of 7,350 feet, as for man at the low European levels.

This whole book is so unexpectedly rich in scientific contributions of the most momentous practical importance that no one working in any of the subjects touched can afford to be without it, and our sister republic deserves to be publicly congratulated on its appearance.

GEORGE BRUCE HALSTED.  
AUSTIN, TEXAS.

#### BOOKS RECEIVED.

*A History of Physics.* FLORIAN CAJORI. New York and London, The Macmillan Company. 1899. Pp. viii + 322. \$1.60.

*The Microscopy of Drinking Water.* GEORGE CHANDLER WHIPPLE. New York, John Wiley & Sons ; London, Chapman & Hall, Ltd. 1899. Pp. xii + 300 and 19 plates.

*Who's Who, 1899?* Edited by DOUGLAS SLADEN. London, Adam and Charles Black; New York, The Macmillan Company. 1899. Pp. xx + 1014. \$1.75.

*Laboratory Manual in Astronomy.* MARY E. BYRD. Boston, Ginn & Co. 1899. Pp. ix + 273.

*Experimental Morphology.* Part II. Effect of Chemical and Physical Agents on Growth. CHARLES BENEDICT DAVENPORT. New York and London, The Macmillan Company. 1899. Pp. xviii + 508.

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#### SCIENTIFIC JOURNALS AND ARTICLES.

*American Chemical Journal*, February: 'On the Constitution of the Salts of Imido-Ethers and other Carbimide Derivatives,' by Julius Stieglitz. 'On the Hydrochlorides of Carbo-phenylimid Derivatives,' by H. N. McCoy. 'On the Solubility of Argentic Bromide and Chloride in Solutions of Sodic Thiosulphate,' by T. W. Richards and H. B. Faber. From a study of the solubility and effect upon the freezing points of solutions caused by these salts certain conclusions have been drawn as to the probable nature of the substances present in solution. 'Note on the Spectra of Hydrogen,' by T. W. Richards. The author considers the presence of the red spectrum to be due to a breaking-down of water vapor forming atomic hydrogen, which gives the red spectrum. If the gas is perfectly dry the white spectrum alone is obtained.

J. E. GILPIN.

THE first number of *Bird Lore*, edited by Mr. F. M. Chapman, and devoted to popular ornithology, has just appeared. As the official organ of the Audubon Society, and in appealing to young readers as well as old, *Bird Lore* essays to cover a new field. The frontispiece is a view of John Burroughs at 'Slab Sides,' and the first article, 'In Warbler Time,' is from his pen. There are two articles illustrated by photographs from life, by Dr. T. S. Roberts and H. W. Menke; Miss Isabel Eaton has a department for teachers and students, and Miss Florence A. Merriam one for young observers; Notes, Reviews and Editorials follow; while the Audubon Department, edited by Mrs. Mabel Osgood Wright, concludes the number.

WE have received the first number of *The School World*, published in Great Britain, by Messrs. Macmillan & Co., and addressed especially to

teachers in the secondary schools. The first number presents an interesting table of contents including articles on 'The Teaching of Algebra,' by Professor G. B. Mathews, F.R.S.; 'Physical Observations of Brain Conditions of Boys and Girls in Schools,' by Dr. Francis Warner; 'Bimanual Training in Schools,' by Mr. H. Bloomfield Barry; 'Elementary Experimental Science,' by Professor R. A. Gregory and Mr. A. T. Simmons; and 'Current Geographical Topics,' by Dr. A. J. Herbertson.

THE Annual Report of the Director of the Field Columbian Museum for 1897-98 notes good progress, particularly in the Departments of Anthropology, Geology and Botany. Two of Mr. Akeley's fine groups have been added to the exhibition series, one of the Oryx and one of Waller's Gazelle, the latter very striking from the pose of the principal figure and from the extreme length of neck and limbs obtained by these animals. One of the plates in the report shows the large model of the moon recently noticed in SCIENCE. The Director notes that special attention has been given to what he aptly terms the 'highly important but uninteresting and endless labor' of cataloguing, inventorying and labelling

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#### SOCIETIES AND ACADEMIES.

##### THE BIOLOGICAL SOCIETY OF WASHINGTON.

THE 300th regular meeting of the Biological Society of Washington was held January 14, 1899, President Frederick V. Coville in the chair. Brief notes were presented by the following members: Ashmead, Bailey, Pollard, Erwin F. Smith, Chesnut and Cook. Mr. Ashmead exhibited specimens of a very rare South American wasp (*Chirodamus*), the type of which was secured by Charles Darwin during the voyage of the 'Beagle.' The new specimens were secured by the U. S. Fish Commission and belong to the National Museum.

Mr. Vernon Bailey described a case of protective coloration in *Ochotona*, a coney native to the mountains of California. One of the broken pieces of the rocks among which the animals live was shown in comparison with a stuffed specimen. Mr. Chesnut submitted photographs and fruits of the California Laurel